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ABSTRACT

Rapid changes in manufacturing technology and procedures have created a need for additional training for manufacturing workers. Traditional postsecondary vocational training is generally perceived as not adequately meeting this need because vocational training programs quickly become obsolete in the face of rapid workplace change. Customized labor training, typically implemented at the workplace, has been identified as a possible alternative to vocational training. Such training programs are frequently oriented toward specific organizational needs rather than toward general skill development. Based on 65 in-depth interviews with personnel directors, trainers, and students in 20 organizations using customized labor training programs, 3 different settings are specified that entail different background conditions and outcomes for customized training: (1) large, unionized monopoly sector firms that have developed intensive training programs; (2) smaller, periphery sector firms that use state support for training largely as a subsidy to underwrite initial orientation costs for workers; and (3) new starts, many of them Japanese owned, that substitute training in communication skills and group processes for training in specific job skills. The implications of these different settings for the future of customized labor training are discussed. (56 references) (Author/NLA)

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CUSTOMIZED TRAINING IN THE WORKPLACE

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PREFACE

Since May 1987, Indiana University has participated in an Ameritech Foundation sponsored program which is focused on ten mid-western universities. Each of the ten universities is a recipient of a multi-year grant from the Foundation which helps fund research and intellectual activity in one or more of the following areas: strengthening economic vitality, particularly in the Great Lakes region; stimulating the contribution of new technologies to our society; and improving the process and techniques of regional and national public policy formulation and implementation.

The Ameritech Fellowship Program at Indiana University coordinates a program of research and education whose theme is "Leadership in Regional Development." Through the Program's activities, public policy/economic development knowledge is being enhanced and investments in human capital for development and public policy leadership are being made. Activities include faculty and graduate student research; seminars, conferences, and colloquia; and publications.

The Indiana University Ameritech Program is administered through the Institute for Development Strategies (IDS). IDS serves as a focal point for Indiana University's contributions to the regional economic development field through its coordination of faculty research, seminars, courses, and workshops. A primary goal of IDS is to foster interdisciplinary interest and cooperation in the regional economic development area.

An integral component of Indiana University's Ameritech Fellowship Program is faculty and graduate student research on economic development issues facing the Great Lakes states. This series of occasional papers serves as a vehicle for the dissemination of these research findings.

The Ameritech Fellowship Program at Indiana University would like to acknowledge and express our appreciation for the support of the Ameritech Foundation for this project.

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*Authorship is listed alphabetically. The authors shared equally in all phases of the research project. We would like to express our appreciation to the anonymous reviews for Work and Occupations and to Curt Tausky for their insightful comments on earlier drafts of this paper. We would also like to thank the interviewees who gave generously of their time during their busy work schedules. Finally, we would like to thank Ed Hornback, Executive Director of Business and Industry Training, State Vocational Technical College, who provided us with a list of companies that had received state funding for customized labor training and who introduced us to many of the issues we would later pursue in our research. The interpretations offered in this paper are our own and are not necessarily those of any of the people who aided us in our research.

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

INTRODUCTION 2

THE DEMAND FOR NEW SKILLS 3

TRAINING FOR NEW SKILLS 6

METHODS 9

VARIETIES OF CUSTOMIZED LABOR TRAINING 12

- Core Firms 12
- New Starts 15
- Periphery Firms 17

DISCUSSION AND CONCLUSIONS 19

REFERENCES 24

EXECUTIVE SUMMARY

Rapid changes in manufacturing technology and procedures have created a need for additional training for manufacturing workers. Traditional post-secondary school vocational training is generally perceived as not adequately meeting this need because vocational training programs quickly become obsolete in the face of rapid workplace change. Customized labor training, typically implemented at the workplace, has been identified as a possible alternative to vocational training. Such training programs are frequently oriented toward specific organizational needs rather than toward general skill development. Based on in-depth interviews with personnel directors, trainers, and students in twenty organizations utilizing customized labor training programs, we specify three different settings that entail different background conditions and outcomes for customized training: large, unionized monopoly sector firms that have developed intensive training programs; smaller, periphery sector firms that use state support for training largely as a subsidy to underwrite initial orientation costs for workers; and new starts, many of them Japanese owned, that substitute training in communication skills and group processes for training in specific job skills. The implications of these different settings for the future of customized labor training are discussed.

INTRODUCTION

Manufacturing technologies and operating procedures are changing more rapidly at the end of the twentieth century than at any time since the development of mass production technologies in the early years of the century (Blanchard, 1984; Cherns, 1980; Cornfield, 1987; Jones, 1982). The mass production technologies introduced at the beginning of the twentieth century brought thousands of semi-skilled workers into factories, displacing the organization of production based on skilled craft labor (Noble, 1984). The new technologies and operating procedures emerging at the end of the twentieth century are creating a demand for at least some workers with greater skills and training both to understand and use the new technologies and to participate in new team-oriented systems of production (Cole, 1989; Danziger, 1985; Lillrank and Kano, 1989).

Many of the new skills needed are specific to increasingly sophisticated and specialized production technologies (Boddy and Buchanan, 1981; Francis, 1986). As a result, existing vocational training programs which focus on training for traditional skilled trades, such as electricians, automobile mechanics, and computer programmers, are increasingly unable to meet the need for skilled and trained workers in manufacturing settings (Geber, 1987). Dramatic increases in post-secondary enrollments outside of four-year colleges and universities have occurred in recent years (National Center for Education Statistics, 1985). However, the graduates of such programs typically gain little measurable improvement in their occupational placement or income relative to high school graduates (Oakes, 1985). In brief, training is needed but our traditional educational institutions do not appear able to provide it (Dougherty, 1987).

On-the-job training has always been important for creating and maintaining a skilled labor force (Spenner, 1983). Between 1929 and 1982, on-the-job learning is estimated to have been responsible for 55 percent of the improvements in labor

productivity compared to only 26 percent for pre-employment schooling (Denison, 1984). With today's more sophisticated and rapidly changing productions systems, training strategies that incorporate significant on-the-job components have drawn increasing attention as a possible strategy for addressing widely shared concerns over the declining competitiveness of the United States economy (Duvall, 1983; Rumberger, 1981). Recent attention in academic circles to the context-specific nature of skills (Harper, 1987) and to tacit skills (Kusterer, 1978; Manwaring and Wood, 1985) parallels and reinforces the new focus on training at the site of production.

THE DEMAND FOR NEW SKILLS

The need for additional training results from three primary factors: new electronic technologies, increased competition, and the spread of innovative ways to organize production on the shopfloor (Chamot and Baggett, 1979). We will discuss each of these in turn. Among the oldest and most frequently cited studies dealing with technology and skills is Blauner's (1964) study of continuous process automation in the chemical industry. Blauner found that continuous process automation requires a greater proportion of skilled maintenance workers than does less automated manufacturing. In addition, machine operators in the chemical industry have greater responsibility for the care and proper functioning of expensive capital equipment than in mass-production settings.

More recently, in a Communications Workers of America membership poll, 78 percent of respondents indicated that technological change had increased the skill requirements of their jobs. Partially automated systems often require workers to take on increasing responsibilities and it is easy to underestimate the depth of knowledge required by technicians who "press buttons" on automated equipment (Adler, 1984). Based on analysis of a variety of work groups within a single organization, Hrebiniak

(1974) finds that job autonomy (similar to Blauner's concept of "responsibility") increases with more advanced technology.

Several studies have emphasized the new skills that workers have to acquire to operate technologically advanced production systems. Based on a study of 36 continuous process companies that are "technical leaders in their industries," Cross (1985) finds an expanding use of electronics in the control and monitoring of production. In interviews with more than 100 workers in these 36 firms, Cross discovered that as a result of the introduction of new technology, workers had to learn important new skills, including the ability to use and maintain a particular type of technology and the ability to diagnose systems problems. Cross sees these increased skill requirements as arising from the use of more complex equipment, from greater integration of different production processes, and from greater demands for product quality. Similarly, Bailey (1990:44) argues that new production systems "call for more mental engagement of workers at all levels of the employment hierarchy." Much of the new automated and semi-automated manufacturing equipment combines electronics, pneumatic control, and various machining or assembly devices. As a result, craft workers with traditional skills in electronics, machining, or pipe fitting need extensive cross-training in new fields to service and maintain the new equipment (Senker, 1984a:142).

Increased competition over markets is today a pervasive reality for United States workers and companies (AFL-CIO, 1983; Bailey, 1990; Malecki, 1984). Few manufacturing companies are completely sheltered from world market competition and many are increasingly integrated into a world system where they are struggling to find a basis on which to compete with technologically and organizationally innovative Japanese and European companies and companies utilizing low wage labor in the Third World. In an increasingly competitive marketplace, the ability to implement rapid changes in products and technologies is often essential for economic viability. A skilled labor force can be the decisive factor in successfully implementing rapid product and technological changes (Congressional Research Service, 1985; Francis et al., 1981; Mishel and Teixeira, 1990).

Some of the strongest challenges to United States market dominance have come from innovative organizational practices that have been developed in Japan and Europe in recent decades (Cole, 1989; Lillrank and Kano, 1989). For example, a seemingly minor organizational innovation called "just-in-time" delivery has had an important role in the Japanese advantage in the automobile industry (Senker and Beesley, 1986). In just-in-time delivery systems, suppliers are required to delivery specified lots of parts to the principal manufacturer on a very exact but rapidly changing time schedule (Senker, 1984a:138). This allows the manufacturer to drastically reduce inventory and related costs. Manufacturers have also combined the demand for just-in-time delivery schedules with demands for tighter quality specifications on the parts delivered. Only those supplier firms that have been able to accommodate these more stringent practices are able to survive in the new marketplace.

Related innovations in operations technology within manufacturing firms are also occurring. One of the most widespread of these is called "synchronized manufacturing." Previous organizations of work have been based on mass production ideologies in which efficiency is attained by maximizing the size of runs and minimizing time lost to set up and design changes. In such systems, operators undertake large runs in which they produce huge volumes of parts of a certain type. The problems that this creates are (1) the parts have to be stockpiled until they could go through the potentially numerous other operations necessary for making them into completed parts, and (2) this ties up machines and operators on a specific run for days or even weeks at a time. New operations technologies are oriented toward smaller runs to accommodate more rapid changes in product specifications. To make synchronized manufacturing procedures work, production floors are often redesigned so that similar machines are no longer grouped together. Instead, a series of different machines needed to complete the various stages of a production process are grouped together. Such spatial arrangements minimize transfer time. Great attention is also focused on decreasing set up time for machine operations through both new technologies and new work procedures. Synchronized manufacturing thus maximizes product diversity and minimizes turn around time.

Such organizational innovations as just-in-time delivery and synchronized manufacturing have played at least as large a role in the changing landscape of market competition as have technological innovations. The implementation of such organizational innovations requires the development of new procedures and training in these procedures across almost every level in the organization (Cole, 1989; Lillrank and Kano, 1989). Although new systems of production may utilize technologies and organizational practices that displace or deskill some labor, modern manufacturing systems are far from fully automated and the need for highly trained workers still exists and has increased in many situations (Cook, 1983; Johnston and Packer, 1987). The nature of those skills and the best ways to learn them, however, are not as yet fully understand. It is these questions that provide the focus in the current article.

TRAINING FOR NEW SKILLS

The question before organizations today is how best to deliver the training that is needed for modern forms of manufacturing. Customized labor training programs oriented toward the needs of specific workplaces are one answer to unmet training needs. Such programs build on the existing skills of workers rather than discounting these skills. Kusterer (1978:179) argues that management disdain for workers has led to the "gross underestimation of the amount of working knowledge actually necessary to [many] jobs". Kusterer argues that the "working knowledge" of workers greatly exceeds the skills stated on job descriptions and that this knowledge contributes substantially to productivity; for Kusterer, there is no such thing as an unskilled job or an unskilled worker. By "working knowledge" Kusterer means not only the knowledge of routine procedures, but also supplementary knowledge about the materials (or documents) handled, the machinery used, expected patterns of customer or client behavior, and the expected work-role behavior of others in the work organization (including management) with whom workers must interact in the performance of their jobs (1978:178). Kusterer's

concept of working knowledge goes beyond the usual definition of blue-collar skills which only recognizes "know-how and manual dexterity" (see also Attewell, 1990; Vallas, 1990).

Building on the existing skills of workers may be increasingly important in successfully implementing many of the new operating procedures in manufacturing today. According to Kelley (1989:303): "The capacity to exploit a new technology depends greatly on the technological know-how and versatility of the workers who are expected to use that equipment." Successfully implementing accelerated schedules for bringing new products on line and generating and capturing incremental improvements in process and in product quality are crucially dependent on a skilled and committed labor force (Carnevale and Goldstein, 1990).

A number of firms, including a number of leading corporations, have made verbal and monetary commitments to build upon and enhance the human capital of their workers (Business Week, 1988). However, Kelley (1989) argues that American companies generally provide only a bare minimum of training for their blue-collar production work force. Thomas (1989:362) similarly argues that United States managers lack a "general belief that investment in human resources affects the organization's competitiveness, especially in an environment in which competitors are perceived to gain advantage through the use of labor-saving technology." Because of their somewhat restrictive focus on technology, United States companies tend to invest in training for their blue-collar work forces only in times of rapid technological change and even then only for the already well-trained segment of their work forces, such as skilled maintenance workers. United States companies have been largely unwilling to take initiative in improving training for the bulk of their blue-collar production employees (Ferman, Hoyman, Cutcher-Gershenfeld and Savoie, 1990; Osterman, 1990).

Corporate interest in financing in-house labor training in the United States is often undermined by high levels of turnover. The United States has the second lowest rate of job tenure among the 13 European countries plus Japan (OECD, 1986:51). The contrast in layoffs is even more extreme. Between 1971 and 1984, the rate of layoffs in the United States averaged six times that in Sweden and Italy and fifteen times that in Japan (OECD, 1986:58). The high rate of labor turnover in the United States has

profound consequences for training (Marsden and Ryan, 1990). "Because of the high inter-firm mobility of labor, only a small fraction of the economic benefits of a better trained work force can be captured by the firm which invests in training" (Kelley, 1989:304). Thus, the lack of commitment of capital to labor (and of labor to capital) in the United States undermines organizational commitment to expanding training.

Many academic observers and shareholders in the workplace believe that because of rapid technological and organizational changes the state of the art in workplace learning is often more advanced than curriculum design and delivery in schools (Carnevale and Goldstein, 1990). In Great Britain, the "New Training Initiative" of 1981 explicitly called for an expansion of continuing adult education and, in particular, for education combined with work experience (Senker, 1984b:134). In the United States, where the individual states are the primary providers of educational services, proposals for continuing education on the job through various forms of customized labor training have had to come primarily at the state level (Duvall, 1983).

Subsidized customized labor training programs have become popular in this context because they provide a way to compensate for the under-investment in training that results from firms doubting they can "capture" the benefits of increased investments in training. In sponsoring customized labor training programs, states have generally identified the firm as the client rather than the worker (Geber, 1987:25). State sponsorship and funding for customized labor training is often an important part of a state's proposal for enticing a new manufacturing facility to locate in the state. For example, General Motors did not locate its Saturn plant in Tennessee simply because of that state's legislation prohibiting mandatory membership clauses in union contracts and generally low level of unionization. Tennessee's successful bid for General Motor's Saturn plant was also based, at least partly, on a very generous allocation of state funds for training programs for the proposed plant's labor force. Criticism against such bidding for manufacturers' favor can often be muted by the claim that the funds are being spent to train members of the local labor force.

Customized labor training has moved from being a political slogan to being a program widely implemented across many states and across a variety of settings. Its

ability to address the training needs of a new system of manufacturing production, however, is largely unproven. A wealth of questions remain to be answered about the viability of customized labor training. What is its effectiveness in cultivating new skills and building on old ones? Since customized training takes place in the setting where the knowledge will be used, in what ways is it different from education that takes place in schools? How is customized labor training differentiated from traditional apprenticeships? And, what, if any, are its limitations and drawbacks?

METHODS

To answer these questions, we studied twenty manufacturing plants that had recently or were currently utilizing customized labor training programs. We visited and toured seventeen of the companies, some of them repeatedly. At three plants we were only able to arrange telephone interviews. The twenty plants were located in the Midwestern United States. Six plants were located in cities with populations greater than 100,000 and with an experienced industrial labor force. Five of the plants were located in smaller cities with populations between 50,000 and 100,000 with a smaller but significant industrial base. The remaining nine plants were in small towns or rural areas and drew upon a labor force with minimal industrial experience. These twenty plants were involved in diverse manufacturing activities, including automobile parts, plastics, metal molding, metal fabrication, heavy machinery, electronics, and packaging.

We interviewed personnel managers, trainers, and workers. The twenty plants at which interviews took place were all recipients of state training funds for customized labor training programs within the previous two years. A total of 65 interviews were completed. Each interview was undertaken by at least two of the primary researchers and the transcripts were reviewed for completeness by each researcher after the interview. Interviews lasted from 20 minutes to over two hours. The interview schedule covered the topics of prior worker training, transferability of skills, problems with and

resistance to the new training programs, and the role of the customized training programs in the overall training agenda of the company. We encouraged respondents to talk freely and adapted the interview to whatever format was most conducive to open discussion.

The degree to which customized training programs contribute to the skills of workers is a central concern of this research. The concept of skill is thus fundamental to our study. We were particularly sensitive to two aspects of skills--task complexity and autonomy. Training for increased task complexity is defined as the degree to which training increases workers' abilities to perform jobs that require an more sophisticated manipulation of people, data, or things (Spenner, 1990). Those training programs that invested time and resources to increase the workers' ability to perform jobs of greater substantive complexity were rated as high on skills training.

We found few instances in which customized labor training was oriented toward allowing workers to work more autonomously. Perhaps this is not surprising given that our sample is restricted to manufacturing establishments. Traditional hierarchial organizations of work prevailed in all the establishments we visited. The current analogue in manufacturing to the call for increased worker autonomy as a strategy for increasing productivity appears to be training in group work procedures and group decision making. Some training programs emphasize training in communication skills and group decision making. Training in such interpersonal skills is intended to facilitate group work practices in which there is collective monitoring and feedback among group members concerning work quality and standards. Training programs that were oriented toward enhancing the workers' ability to work effectively in groups were rated as high on groups training.

Table 1. Three ideal typical settings using customized labor training.

Company	Ideal Type	Level of Competition	Employment Growth	Human Capital	Unionized	Level of Technology	Training in Skills	Training in Groups	Groups Used	Partner-ship
A	core	medium	most	medium	yes	medium	low	least	least	no
B	core	most	medium	medium	yes	medium	medium	low	low	yes
C	core	most	medium	medium	no	most	medium	low	medium	no
D	core	most	low	medium	yes	medium	most	low	low	yes
E	core	medium	medium	most	yes	most	most	low	low	yes
F	core	most	medium	most	yes	medium	most	medium	most	no
G	core	most	low	most	yes	most	most	least	low	yes
H	core	most	low	most	yes	most	most	low	low	no
I	new start	medium	new	low	no	low	low	most	most	no
J	new start	medium	new	medium	no	medium	medium	most	most	no
K	new start	medium	new	most	no	most	most	most	most	no
L	new start	medium	new	low	no	low	low	low	medium	no
M	new start	most	new	low	no	low	low	least	low	no
N	periphery	most	most	low	yes	low	least	least	least	no
O	periphery	medium	medium	low	no	low	low	low	least	no
P	periphery	medium	medium	low	no	low	low	low	low	yes
Q	periphery	low	most	low	no	most	low	low	least	no
R	periphery	most	medium	medium	no	medium	medium	low	medium	no
S	periphery	most	medium	low	no	medium	medium	low	low	no
T	periphery	most	low	most	yes	most	most	most	most	yes

VARIETIES OF CUSTOMIZED LABOR TRAINING

To organize the wealth of data available from our field interviews we selected key variables concerning the environment of the firms, their work forces, and their training programs. These variables and their values for each plant are displayed in Table 1. Based on analysis of these data, there appear to be three distinct types of settings in which customized labor training takes place: large core firms, smaller periphery firms, and new starts. These settings are differentiated by characteristics of firms and also by characteristics of the training program and its outcomes. We will discuss each of these ideal typical settings in turn and elaborate their different consequences for the meaning and viability of customized labor training programs.

Core Firms

Core firms in the United States are under immense pressure in the closing decade of the twentieth century. They are facing fierce competition from manufacturers around the world. No longer do they hold a monopoly or near monopoly on the manufacture of high-priced commodities such as automobiles and steel sold around the world. These high-priced manufactured goods have been exactly those that have attracted world competition. The work forces of core companies typically possess a great deal of skill, experience, and seniority and are generally unionized. New hiring has been limited or nonexistent for a decade or more because of restricted employment growth resulting both from increased competition and increased automation. The eight companies in our study that we categorized as core firms have total employment ranging from 15,000 to well over half a million. The particular plants we visited were often quite large and

employed as many as four or five thousand workers. In many cases, however, they had employed twice as many workers only a decade earlier.

Core companies are under strong competitive pressure but have limited options in responding to this pressure. They have large sunk costs in current plant and equipment. Their labor forces are unionized and will not tolerate massive wage reductions. If these plants are going to compete on the world market, they are going to have to do so by becoming more productive rather than solely by lowering wages. The alternative of drastically reducing labor costs through implementing highly automated manufacturing systems has been increasingly discredited in these industries as early attempts in this direction have shown only limited success (Congressional Research Service, 1985).

Failing other options, core companies have finally faced the need to dramatically increase their productivity. The training programs in these companies were the most impressive we observed. What do these training programs mean for different types of workers?

For production workers, new technologies increasingly require an understanding of "statistical process control" (SPC) in which readings on product characteristics and quality are taken and charted to identify the patterns and causes of product variability. New training for production workers means first of all systematic efforts to identify workers with problems in reading comprehension and basic mathematics. These workers are then encouraged to attend basic literacy and mathematics classes at company expense and often on company time. Such classes are offered in diverse fashions across the various plants we visited. Sometimes they are offered at a community college or trade school. Sometimes they are offered in-house by a subcontracted instructor. And sometimes they are offered in-house by workers who have themselves been through a literacy or mathematics program at an earlier stage. The option of having workers teach other workers is often particularly effective because of the empathy that can develop between students and teachers and because the potential stigma of having to be taught remedial skills by an outsider is avoided. The option of having workers teach basic classes also has the benefit of preserving employment in times of cutbacks. Accordingly, this option is generally preferred by the union.

More advanced classes include blueprint reading and statistical process control. These classes are also taught in diverse fashions including both in-house and out-of-house options. Production workers are in general pleased with the new skills they learn. A worker whose job now includes statistical process control of the parts he is producing reported: "Even if you stay well within margins, the statistical process control tells you when you are losing control. SPC is helping me to feel in control. I check parts all the time, but now I can see that I am really doing well at a certain point. The products are much better. I get feedback. I know I am doing well."

For skilled workers, new production systems require an increased understanding of diverse types of automated machinery. These automated machines are typically electronically controlled, pneumatically powered, and involve the cutting or assembly of parts. Servicing these machines frequently requires knowledge of several craft skills that had previously been more distinct: for example, electronics, pipe fitting, and machining. New training for these workers typically means cross-training in new skills and advanced training in electronics. Most of the cross-training programs are in-house and are conducted by craft workers who acquired additional training from the vendors of the new equipment, or from consultants who were hired to devise new training courses. Perhaps the most common route for acquiring higher level skills for the workers who themselves later become trainers is for the company to negotiate a short-term training contract with the vendor of a new automated machine. Such training contracts are generally seen as a preferred option relative to taking out a long-term service contract with the vendor for the maintenance of the equipment by the vendor's own technicians.

The skilled workers with whom we spoke were extremely pleased with the courses they had taken. They felt that their skills were being expanded and that this was an important precondition both for the company surviving in a competitive marketplace and for their own job security. According to a skilled maintenance worker at a company with a very active training program for skilled workers: "They have a fantastic program for your training at [Company E--see Appendix] and they reimburse you for it. I take a computer class at the community college on my own time. I had another class at [Company E] in cooperation with the community college. I took the classes out of my

own initiative. But some classes are mandatory and you take them during working hours." A worker at a different core plant similarly reported: "Here at [Company B] I received quality excellence training, had training in quality charts, statistical quality control. I had a blueprint reading class. Everybody has to take the blueprint reading class."

At about half of the core sector plants we visited, there is also a clearly articulated and organizationally supported partnership between the corporation and the workers oriented towards maintaining economic competitiveness. The partnerships are supported by such financial arrangements as joint union-management training funds, the financing of which is contractually defined and the dispersal of which is determined by joint union-management committees. The bilateral determination involved in the governance of these training programs provides a mechanism for generating consensus about the specifics of the programs and seems to confer a great deal of legitimacy on the programs. It also appears that the joint union-management program committees are granted a large degree of local control to fashion training programs to suit local needs. At several plants with joint union-management governance of training programs, production workers are routinely being included on purchasing and selling trips to suppliers and customers. The production workers help explain to suppliers their shop floor needs for achieving quality work and help transmit feedback from customers about customers' needs. (See German, Hoyman and Cutcher-Gershenfeld, 1990, for an extended review of joint union-management training programs).

New Starts

New plants have some economic advantages over older plants. For one thing, they hire a new labor force. Often this translates into lower wages because of less seniority. Also, it can take several years for a union to get a foothold in a new plant and wages are generally lower in the absence of a union or a strong union organizing drive. New plants also generally have lower health insurance expenses and retirement liabilities because of their younger work forces. We visited five new starts. Three were owned by

Japanese companies and none were unionized. All were located in rural or semi-rural areas and paid wages between half and two-thirds those paid in core firms. Firms opening new factories typically purchase new equipment that is frequently more efficient and productive than older equipment because of incremental advances in technology. However, it is important to distinguish equipment that is merely more productive from equipment that drastically transforms the production process. Far from relying on novel technologies, the five new starts we studied employed technologies that were on average somewhat simpler and less demanding of high levels of skill than those utilized in the core firms.

Low wages play a key role in these new starts' plans for economic viability. In effect, the rural parts of the United States Midwest are being used as a pool of cheap labor, just as United States corporations utilize parts of the Third World as a source of cheap labor in their efforts to compete on world markets. The pattern of selecting low-wage areas for expansions is widely reported in both the business and academic presses (Treece and Hoerr, 1989:76; Thomas, 1988:178). Skills training is very limited in new start companies. Partly this results from less remedial training being needed for production workers because the companies are very selective in who they hire. They screen carefully on high school completion thus avoiding problems associated with workers without minimum language and mathematics skills. They also screen on personality and background factors. The goal of this screening appears to be to secure a labor force that will be flexible in response to management agendas and that will be unlikely to unionize.

All five new start companies received state money for training programs. What is the money used for, if not for skills training? In general, the money is used to defray the start up costs of hiring new workers and putting them through initial orientation programs. These programs are generally quite modest in nature and typically involve a film about the product and talks by the plant manager or other company officials. The programs also frequently involve some classroom training about the product and its characteristics and a plant familiarization tour. Sometimes these activities take a week, at most two. Often the latter part of the period is used for on-the-job training in which

the worker is rotated though a number of positions on the production line under the supervision of more senior workers. At the Japanese owned companies, though not at the other new starts, there is also a strong emphasis on learning to work in groups. Often this involves time away from production in which workers are instructed in Japanese principles of quality control and team effort. For some workers this even involves a trip to Japan to observe production techniques in the parent company.

The skilled trades are noticeably absent from the new start companies. Production machinery is maintained under contracts with the vendors and other needs requiring skilled labor are generally met by contracting the service on a short term basis. The limited reliance on highly skilled workers in the new starts constitutes a very different arrangement from that prevailing in core firms and this difference has a number of implications. In the new starts, workers are asked to focus on product quality but they are not encouraged to learn in depth about the machinery they use and its maintenance. The skills that workers can expect to achieve in the new start plants are thus somewhat limited and are largely product specific. The limited range of skills developed by workers in new starts may undermine their job security in the face of cutbacks. Since workers' skills are limited to just one specific type of production process, their employability outside the plant will also be more limited than that of workers who are allowed to expand their skills into machine maintenance.

Periphery Firms

Periphery firms utilize diverse levels of technology to fill their market niche. However, even when new, the technologies utilized are generally less expensive and less sophisticated than those used in the core firms. According to a worker at Company R, "It is more stressful with the new machines. Because it is not the best equipment. There are many flaws in it. It may take off. It has bugs in it. They try to work on it. They fill it up with oil; then it works better for a short time. They know it has bugs in it."

An important component of the economic viability of periphery sector firms is that they pay low wages. In spite of these firms' low wage bills, there are few safeguards

that they will remain economically viable. If another firm becomes interested in their market niche, it seems likely that they could be displaced fairly easily by a company utilizing a more advanced technology and a more skilled and trained labor force. Both workers and managers at these companies are aware of these dangers and appear to live in a chronic state of worry as a result.

In spite of these worries, efforts at training in periphery settings are quite modest. According to a worker at Company P, "Many things are self taught. You teach yourself the easy way. The plant is not as automated as it should be. You do not really receive feedback from the SPC system, because they are just collecting the data. I just give them what they want. It usually looks good on a piece of paper but the classes I took on it were a waste of time and money. Most of the training is hands-on experience." A worker at Company T was even more blunt about the limited training she received at her work place: "When you first start, someone will show you how to start it and stop it. Once in a while they come and make sure everything is running well."

State training funds had generally been granted to these firms to help defray the costs of an employment expansion or to help bring in a modest technological change. At one firm we visited, the latest technology was a power screwdriver that replaced an older manual screwdriver used for attaching parts to a plastic panel. The workers were very pleased with the new power screwdrivers because use of the manual screwdrivers had been associated with widespread instances of tendinitis and carpel tunnel syndrome. However, it is unlikely that such modest improvements in equipment have very significant effects on accumulated human capital or transferable skills.

Training in groups is likewise missing in most of the periphery companies. While many core firms and new starts utilize aspects of the "new industrial relations practices" of the 1990s, few of the periphery firms employ these practices or even evidence an awareness of their existence. In effect, industrial relations in the periphery firms are largely as they had been since the Second World War, while industrial relations in the core firms and new starts have changed dramatically in recent years.

In two of the periphery companies, however, dynamic managers were incorporating a variety of new industrial relations practices into their otherwise low skill

and low to medium technology operations. These practices included more individual recognition for workers, some job rotation, a reduction in status differences between workers and managers, and an increased commitment to safety with large plant-wide bonuses at the end of each year without a serious accident.

The difference in industrial relations practices between these two companies and the other periphery sector firms does not appear to result from any structural differences in their market niches or their work forces but instead appears to result directly from the aggressive agendas of dynamic plant managers. These plant managers believe that these modest changes in management style can increase worker satisfaction, commitment, and productivity without more profound changes in production technology or training. In this way they hope to provide for themselves (and their workers) some minimum protection from the vagaries of the market for their product. These two more progressive plant managers thus attempted to engineer something similar to the partnership arrangement between capital and labor evidenced in about half of the core firms, but on the basis of a much more poorly paid and less well trained labor force. It is difficult to evaluate the success of these efforts. On one hand, the workers at these two plants spoke very favorably of their work and evidenced an eagerness to help make their companies viable ongoing operations in any way they could. On the other hand, limitations on accumulations of human capital and transferable skills lessen the value of these arrangements for workers. For management and the company, such arrangements are perfectly satisfactory: they secure a committed labor force at a minimum price.

DISCUSSION AND CONCLUSIONS

The most aggressive training programs we observed are a result of negotiated arrangements between management and labor in core sector firms. These programs are often associated with advanced technologies but do not appear to result directly from technologically determined needs. In the new starts and periphery firms that sometimes

also utilize sophisticated technologies, training is less widespread and less intense. Labor and management in core sector firms are forced into the strategy of increasing training by increased international competition and both have something to gain from it. If production is to continue at these plants, productivity has to increase. Profits can not be increased without productivity gains through slashing wages because the largely unionized work forces at these plants will not tolerate it. Extreme automation has been tried experimentally but the limits of this strategy have rapidly become apparent. The only route left is a collaborative effort to increase productivity through increased training and innovative labor practices. In this context, customized labor training programs meet a pressing need for which there are no readily available alternatives.

In core sector firms, customized labor training helps to bring into being both specific usable skills and what Coleman (1988) refers to more broadly as social capital: the network of obligations, expectations, norms, and trust that make a social structure function effectively. The effectiveness of these programs depends on the companies making substantial investments in workers' skills (Thomas, 1989). This corporate commitment to "life-long learning" is reciprocated by workers giving the extra effort involved in learning new skills, both on and off company time. This commitment to life-long learning as a productive strategy also allays, to a certain extent, workers' pivotal concern with job security. Genuine skill training not only increases workers' productivity at their current place of employment but also increases their employability elsewhere.

In settings where wages are low, skill training is looked on with greater caution by management because if the employability of low-wage workers is increased, they may leave their jobs in the search for higher wages. Thus, the aggressive training strategy practiced by core firms is only likely to emerge in a high-wage, unionized context where workers are able to demand training and resist other management options for increasing competitiveness, such as cutting wages.

A significant obstacle that customized labor training programs encounter in core firms is the high prevalence of inadequate basic skills in their existing work forces. These deficits had to be remedied as a first step in training if workers were to have the language and mathematics skills necessary to learn statistical process control and other

procedures. Many of those involved in customized labor training programs voiced the opinion that primary and secondary schools should stress basic skills and leave vocational training to be carried out at the work site where it can be taught most effectively (see Oakes, 1985:169; Levitan and Gallo, 1990).

An important limitation of customized labor training programs is that they create transferable skills but generally without a credential to establish the possession of these skills. In the past, training for the skilled trades was standardized through joint union-management programs, parts of which were carried out under the auspices of trade schools and many of which were registered with State Apprenticeship Councils or the Board of Apprenticeship and Training, United States Department of Labor. Progression through these training programs resulted in the attainment of a specific level in a skilled trade. The current situation with customized labor training is much more diffuse than this, partly as necessitated by the rapidity of the technological changes that are taking place. Some of the customized training programs are carried out at trade schools or community colleges. Other programs employ community college teachers to instruct classes in-house at the place of work. Other programs employ workers who have themselves graduated the programs or otherwise acquired the relevant knowledge. Community colleges have become more flexible in recognizing such programs and in helping to coordinate them into degree and certificate granting programs. Further advances in this regard would help to remedy an important current limitation of customized labor training programs: the absence of credentials certifying the knowledge acquired. In spite of these limitations, the training programs at the core plants were generally more closely integrated with both public and private community educational services and providers than were training programs in other plants.

In settings outside core firms, the problems with customized labor training are more severe. Often no training takes place other than an orientation session the first week of work. The customized labor training that takes place outside core firms is often non-cumulative and does not generate significant increases in the human capital of the worker that can be transferred to other employment settings. In the new starts owned by Japanese companies, more training is likely to take place than in other new starts or

periphery firms; however, it is largely restricted to training in communication skills and team orientations. Much of this training is simply indoctrination in the company's philosophy. There seems no reason that schools can not teach these same communication and group process skills as part of standard curriculum at least as effectively--if not more so--and with less propaganda content. Communication and group process skills are not context specific in nature and there is little reason that they should be taught at the workplace as opposed to a school setting.

The wisdom of combining training in communication and interaction skills with philosophies of obedience to the corporation has been questioned by various social commentators (see Grenier, 1988). Smith (1990) refers to such systems of forced group participation as "coercive autonomy." Current management philosophies suggest that productivity can be increased by taking power away from supervisors and giving it to teams of self-monitoring workers. Such a shift of power is not intended to diminish the power of top management to make the key decisions about the workplace. Indeed, one of the attractions for management of dispersing power to work groups may be that they can rely on the self monitoring and competitive nature of groups to keep the work group operating according to the goals set out by management (Dohse, Jurgens and Malsch, 1985). Supervisors clearly have less power in this new system. It is unclear, however, that individual workers have more autonomy under group systems of production than under more direct systems of control. And given the association of group systems of control with anti-union agendas, they may have less (Grenier, 1988).

If states' investments in customized labor training are to have a lasting affect on economic development, these investments will have to be delivered in such a way that workers become repositories of skills. Customized labor training can be an effective way to deliver such training because of the importance of context in training for many skills. However, customized labor training is no panacea, especially where the training is little more than orientation or indoctrination as is the case in many of the periphery firms and new starts. In core sector firms with joint union-management sponsored training programs, extensive cross-training of skilled trades is combined with some skill upgrading for assembly workers and some training in communication skills to facilitate greater

worker-management cooperation. Some training in both technical skills and communication skills thus appears to be necessary for the most effective programs. Training in communication and group process skills alone has serious limitations.

States have been willing to fund customized labor training as a way of encouraging economic development. However, they have been reluctant to hold companies accountable for job quality, certification of skills, or skill transferability. This reluctance comes partly from the use of customized labor training funds as a subsidy to entice companies to locate in the state or to remain there. Customized labor training funds are a politically acceptable form of corporate subsidy because an appeal can be made that the money is spend on education and training. Many state programs serve multiple ends. Unfortunately, in this case, the integrity of the primary goal of providing education and training is sometimes compromised by the goal of providing corporate subsidies.

Customized labor training provides a potentially important mechanism through which skills essential for economic development and job security can be developed. However, several limitations must be addressed if it is to reach its full potential. Some form of credentialing needs to be developed for the skills learned through customized training, and firms must be held accountable that generalizable skills are trained. Otherwise, states would probably be better off spending tax money on the sort of general education that can be delivered in school settings. In addition, if state money is to be used to entice companies to stay in the state or to move there, these monies should be clearly differentiated from funds earmarked for training. Customized training offers an important new mechanism for delivering high level skill training of the sort desperately needed in the United States today. The problems and limitations identified here need not be insurmountable.

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